

REMARKS

This paper responds to the Office Action mailed on December 30, 2003. By this response, Applicant incorporates all Applicant's responses including traversals to the Office Action that was mailed on May 29, 2003.

Claims 41 and 42 are amended; as a result, claims 33-62 are now pending in this application.

Information Disclosure Statement

Applicant respectfully requests that a copy of the 1449 Form, listing all references that were submitted with the Information Disclosure Statement filed on February 28, 2002, marked as being considered and initialed by the Examiner, be returned with the next official communication. For the examiner's convenience, applicant herewith encloses a copy of the previously filed form PTO-1449. If the USPTO file does not include copies of the documents listed on the form PTO-1449, the undersigned requests that the examiner call the undersigned and copies will be provided.

Claim Objections

Claims 40-41 and 55-60 were objected to because of informalities.

Claims 40 and 41 have been amended to replace the word "or" with the word --and-- where referred to by the Examiner. Withdrawal of the objections is respectfully requested.

Regarding the objection to claim 56, Applicant agrees that the phrase suggested by the Office is acceptable. Applicant has defined the language of claim 56, however, clearly within the specification:

At these magnifications, the more than three monolithic crystallographic surfaces designated in Figures 2-4 are also described as a substantially curvilinear bottom profile of epitaxial semiconductive material.

(Detailed Description at page 8). Because Applicant may be his own lexicographer, and because the expression is clearly defined in Applicant's disclosure, withdrawal of the objection is respectfully requested.

Regarding claims 55 and 58, where the Office desires to continue using the "tourist" example, Applicant respectfully asserts the Office's hypothetical tourist is without a map, whereas Applicant has provided a map (Detailed Description) with illustrations (FIGs.) for the interested public, particularly for individuals of ordinary skill in the art:

Recess 120 is bounded in the Y-dimension with a first shallow trench isolation (STI) 134, a second STI 136, and bottom 132.

(Detailed Description at page 10 and e.g., FIGs. 13A and 13B). Because Applicant may be his own lexicographer, and because the expression is clearly defined in Applicant's disclosure, withdrawal of the objection is respectfully requested.

§112 Rejection of the Claims

Claims 39-40 and 48-55 were rejected under 35 USC § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicant regards as the invention. Applicant respectfully traverses these rejections and requests the Office to consider the following.

Regarding the terminology "minimum feature", Applicant respectfully asserts that the discussion thereof in Applicant's disclosure is sufficient to school the unlearned and to remind those of ordinary skill in the art:

By way of further reference, according to design rules, a minimum feature, F, may be part of the metric of the structure depicted in Figures 10A and 10B. In this embodiment, the minimum feature, F, may be the size of first STI 134 or second STI 136 as viewed in the Y-dimension. For example, photolithography process flows may have minimum features that are 0.25 micrometers (microns), 0.18 microns, and 0.13 microns. It is understood that the various metrics such as 0.25 microns may have distinctly different dimensions in one business entity from a comparative business entity. Accordingly, such metrics, although quantitatively called out, may differ between a given two business entities. Other minimum features that may be accomplished in the future are applicable to the present invention.

(Detailed Description at page 11). Applicant is not claiming a size range, rather a qualitative element in the structure. Applicant respectfully assert that the term "minimum feature" is a qualitative term that relates to photolithographic limitations for photolithographically achieved structures, as understood in the art. Withdrawal of the rejections is respectfully requested.

Regarding claim 50, Applicant respectfully asserts the reply by the Office is disingenuous. The Office Action states "Applicant asserts that the claim requires that the recess

be in the substrate, while there is no such limitation." (Office Action at page 13). Applicant respectfully asserts that every *conceivable* reading of the claim is not necessary; only reasonable ones that can be understood by reference to the Applicant's disclosure. Applicant notes that withdrawn claim 11 teaches that the recess exposes both the substrate (inherently) and the STI (explicitly):

etching a recess in the substrate, wherein the recess exposes the substrate with a substrate bottom and two substrate sidewalls, and wherein the recess exposes the STI structure with an STI sidewall

(Claim 11). Since the phrase in claim 50 states "the recess exposes at least a portion thereof", and since *e.g.*, claim 11 and *e.g.*, FIG. 10B, show that the recess 120 exposes both, there is no vagueness in claim 50 and its dependent claims.

Applicant notes the context of claim 50 means the recess exposes at least a portion of the STI structure. This is clear by a plain reading of claim 50. The recess is in the substrate and inherently exposes the substrate. Consequently, the recess exposing the substrate would be set forth immediately following the claim portion, "a recess disposed between the source and the drain" *e.g.*, claim 11. Withdrawal of the rejection is respectfully requested.

§102 Rejection of the Claims

Claims 33-34, 36-38 and 41 were rejected under 35 USC § 102(e) as being anticipated by Nakagawa (U.S. 6,239,465). Applicant respectfully traverses the rejection and requests the Office to consider the following.

"A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." (*Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987), M.P.E.P. §2131, 8th Ed., Rev. 1).

Applicant respectfully disagrees that "the method of fabrication is not relevant to claims drawn to a [vertical transistor]." (Office action, pages 13-14). It is well settled, and a guide to an examiner's duties that

[t]he structure implied by the process steps should be considered when assessing the patentability of product-by-process claims over the prior art, especially ... where the manufacturing process steps would be expected to impart distinctive structural characteristics to the final product.

(M.P.E.P. §2113, 8th Ed., Rev. 1). Applicant respectfully asserts the structure as claimed and illustrated is distinct from the epitaxial layer of Nakagawa. Withdrawal of the rejections is respectfully requested.

Applicant respectfully asserts that even if the Office's definition of "localized" were applicable to Applicant's meaning of localized, Nakagawa would still not have "more than three monolithic surfaces" (Claim 33). But only claim 33 requires the epitaxial semiconductor film is "localized". The localized nature of the epitaxial semiconductor film is defined in Applicant's disclosure at page 7:

The mobilization of silicon within recess [12], and its redeposition, results in a localized epitaxial semiconductor film 38. The localized nature of epitaxial semiconductor film 38 means that it forms primarily within recess 12.

Nakagawa's epitaxial layer 25 is not "localized" as defined by Applicant. Further, the formation of Nakagawa's trenches 30 and 32 are done subsequent to formation of the epitaxial layer 25, which makes it impossible for Nakagawa's epitaxial layer 25 to be "localized" as defined by Applicant. Because Nakagawa does not anticipate claim 33, withdrawal of the rejections is respectfully requested.

Regarding claim 34, the Office Action incorrectly states Nakagawa's "electrode has an electrode upper surface that is below the substrate upper surface." (Office Action at page 5). Nakagawa's control gate 38 has no upper surface that is below the substrate upper surface. The Office attempts to call Nakagawa's "floating gate 38" an electrode. (Office Action at page 14). But in FIG. 4I *et seq.*, it is clear that structure 38 has been isolated; hence it is a floating gate and not an electrode. In any event, because claim 34 depends from claim 33 and because Nakagawa does not anticipate claim 33, withdrawal of the rejection is respectfully requested.

Applicant notes claims 34, 36-38 depend from claim 33, and Nakagawa therefore also does not anticipate these claims. Withdrawal of the rejections is respectfully requested.

Claims 43-44 and 46 were rejected under 35 USC § 102(b) as being anticipated by Kato et al. (JP 356058267 A). Applicant respectfully traverses the rejection and requests the Office to consider the following.

Claim 43 requires "a recess disposed between the source and the drain" Kato's groove 205 is not disposed between his source 204 and his drain 201. Kato's groove 205 is disposed between two sources 204 on the left, and an unlabeled source on the right of the groove 205.

The Office Action asserts that "

the groove lies directly between the source (204) and drain (202). The drain comprises the layer 202, including the portion to the right and below the groove. The groove is directly between this portion of the drain and the source.

(Office Action at page 14). But this is not correct. The characterization by the Office is a distortion of Kato's plain teaching. A portion of the source is the N⁺ region that is unlabeled and on the right of the groove 205. The Office is improperly using semantics to assert the groove is between the source 204 and the drain 202. But Kato teaches a vertical structure that has its current flow through the drain electrode 209 that is "built up on the back of the substrate" (Kato). Applicant's disclosure distinctly teaches X-Z and Y-Z dimensions that give meaning to the scope of what is claimed. By Applicant's disclosure, Kato only teaches the groove is between the source 204 and another portion of the source, labelled N⁺. Kato therefore does not anticipate claim 43 and withdrawal of the rejections is respectfully requested.

Applicant notes claims 44 and 46 depend from claim 43, and Kato therefore also does not anticipate these claims. Withdrawal of the rejections is respectfully requested.

§103 Rejection of the Claims

Claims 39-40 and 61-62 were rejected under 35 USC § 103(a) as being unpatentable over Nakagawa. Applicant respectfully traverses the rejection and requests the Office to consider the following.

To establish a prima facie case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. *In re Vaack*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). (M.P.E.P. § 2143 8th Ed., Rev. 1).

Applicant notes as set forth above, Nakagawa does not anticipate claim 33, from which claims 39 and 40 depend. Because all the elements of the independent claim are not taught in Nakagawa, neither are all the elements in the dependent claims. Accordingly, the third criterion

establishes there is no prima facie case of obviousness. Withdrawal of the rejections is respectfully requested.

Regarding claims 39 and 40, the Office Action is mistaken about Nakagawa teaching "a vertical transistor, wherein the substrate includes: an N+ doped source and an N+ doped drain disposed on opposite sides of the recess" (Office Action at page 7). Referring the Office to Nakagawa's FIG. 4G, the source 24 (a diffusion layer) and the drain 28 (identified in FIG. 4D, a diffusion layer) are on the same side of the trench 32. Withdrawal of the rejections is respectfully requested.

Regarding claims 61 and 62, as set forth above, Nakagawa does not teach "an epitaxial semiconductor film comprising more than three monolithic surfaces" (Claim 61). None of the "memory systems" cited reference remedy this deficiency. No prima facie case of obviousness has been established. Since all the elements of claim 61 are not found in the references, Applicant requests withdrawal of the rejection and reconsideration and allowance of claim 61. Applicant further notes that obviousness is a question of the subject matter as a whole, and Applicant respectfully asserts claim 61 is unobvious over the cited reference. Withdrawal of the rejections is respectfully requested.

Regarding claim 62, because it depends from claim 61, no prima facie case of obviousness has been established. Applicant respectfully requests withdrawal of the rejection.

Claim 47 was rejected under 35 USC § 103(a) as being unpatentable over Kato et al. Applicant respectfully traverses the rejection and requests the Office to consider the following.

The Office Action admits Kato does not teach a doped polysilicon electrode. Where the Office is taking official notice, Applicant requests the Office to cite a reference or provide an affidavit. Otherwise, Applicant respectfully requests withdrawal of the rejection.

Claims 48 and 49 were rejected under 35 USC § 103(a) as being unpatentable over Kato et al. as applied to claim 47 above, and further in view of Min (U.S. Patent No. 6,476,444). Applicant respectfully traverses the rejection and requests the Office to consider the following.

The Office Action is mistaken regarding the structure in Kato. Kato's groove 205 is not disposed between his source 204 and his drain 201. Kato's groove 205 is disposed between two sources 204 on the left, and an unlabeled source on the right of the groove 205. The Office Action attempts to construct Kato's source and drain to be on opposite sides of the recess, but

contradicts this assertion by stating "(top and bottom)". The Office Action next appeals to Min to remedy no teaching in Kato's failure to teach STI structures. (Office Action at page 10). But neither Min nor Kato singly or in combination teach or suggest the limitation in claim 43, from which claims 48 and 49 depend, of "a recess disposed between the source and the drain, wherein the recess comprises a substantially curvilinear bottom profile of epitaxial semiconductive material" (claim 43). Applicant respectfully asserts therefore the Office has used the Applicant's disclosure as a guide to combine references. Applicant respectfully asserts that no prima facie case of obviousness has been established. Withdrawal of the rejections is respectfully requested.

Claims 50-55 were rejected under 35 USC § 103(a) as being unpatentable over Kato et al. in view of Min. Applicant respectfully traverses the rejection and requests the Office to consider the following.

The deficiencies of Kato and Min, singly or when combined, are set forth above and are incorporated herein by reference. The Office Action admits "Kato does not teach a monocrystalline substrate." (Office Action at page 11). The assertion by the Office that "[m]onocrystalline substrates are a well known substrate material etc." (ibid). is not in dispute. Because Applicant is entitled to claim what is new and unobvious, Applicant asserts the subject matter as a whole is not taught or suggested by the cited references. Withdrawal of the rejections is respectfully requested.

Regarding claims 51-54, Applicant notes that the claim language calls out structure that is neither taught nor suggested in Kato or Min, either alone or in combination. Because all the claims limitations are not taught or suggested, withdrawal of the rejections is respectfully requested.

Regarding claims 56-60, Applicant notes that no art rejection of these claims is provided in the Office Action, although claim 58 was rejected under 35 U.S.C. § 112 ¶2 as set forth above. Applicant respectfully asserts that the cited references, either alone or in combination, fail to teach or suggest the limitations of claims 56-60. Applicant earnestly requests a notice of allowability of these claims, along with claims 33-55 and 61-62.

Allowable Subject Matter

Claims 35, 42 and 45 were objected to as being dependent upon a rejected base claim, but were indicated to be allowable if rewritten in independent form including all of the limitations of

the base claim and any intervening claims. These claims are so rewritten. Please charge any excess claim fees to the undersigned's deposit account no. 19-0743.

CONCLUSION

Applicant respectfully submits that the claims are in condition for allowance and notification to that effect is earnestly requested. The Examiner is invited to telephone Applicant's attorney at (612) 349-9587 to facilitate prosecution of this application.

If necessary, please charge any additional fees or credit overpayment to Deposit Account No. 19-0743.

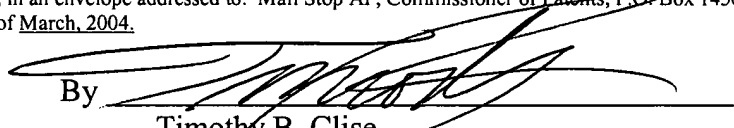
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CERTIFICATE UNDER 37 CFR 1.8: The undersigned hereby certifies that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail, in an envelope addressed to: Mail Stop AF, Commissioner of Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on this 1st day of March, 2004.

Date

1 March '04

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